

LANDSCAPE BLOCKS

BioMap2 Components

Core Habitat: NA

Critical Natural Landscape: **Landscape Blocks**

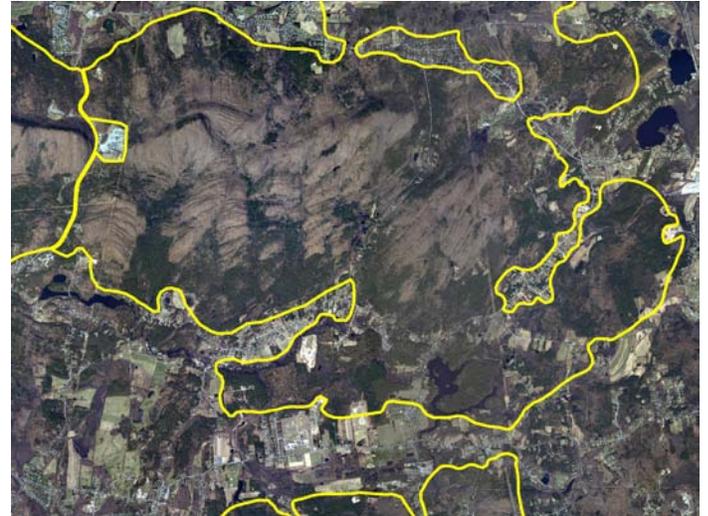


Figure 1: Example of *BioMap2* Landscape Block

LANDSCAPES: THE BIGGER PICTURE

Large intact landscapes provide diverse habitats at a scale necessary to sustain healthy populations of wide-ranging species like Moose, Black Bear, and Bobcat. These animals travel great distances and have large home ranges (the area where an animal lives and travels over the course of a year). The integrated patchwork of wetlands, uplands, and rivers that are found in unfragmented landscapes allows animals to move freely among habitats, supporting daily movements, migration, dispersal, and colonization of new habitats. Intact landscapes also facilitate shifts in the geographic distribution of species, a process that is likely to accelerate in response to climate change in the coming decades.

In contrast to intact landscapes, landscapes fragmented by roads and development result in smaller and more isolated habitat patches, with barriers and resistance to movement. Species that are dependent on intact landscapes avoid developed areas. Direct mortality on roads, combined with indirect impacts of development such as noise, light, pollutants, and invasive species, provide additional hurdles for vulnerable species.

Landscapes also support ecosystem processes and interactions among different habitats, making the whole greater than the sum of the parts. For example, large forested watersheds capture, filter, and gradually supply clean, cool water and nutrients to our river networks, supporting a wide array of fish, mussels, insects, reptiles, amphibians, and mammals. Intact landscapes also buffer smaller and more sensitive species and natural communities—such as wetlands, vernal pool species, freshwater habitats, and rare ridgetop inhabitants such as Timber Rattlesnakes—from the impacts of roads and development. Landscapes are naturally dynamic, described by some as shifting mosaics. Over time, habitats and ecosystems expand, contract, and shift location across larger

landscapes as a result of species interactions, natural disturbances, and climate change. The dynamic nature of landscapes, which can only occur in large intact areas, results in a mosaic of habitat types and patches that in turn support a wide array of species. For example, disturbances such as blowdowns, ice storms, tornados, and other weather events result in patches of young forest embedded within larger patches of older forest. Many species depend on these younger forests for breeding and foraging habitat. Another example of a dynamic natural process is the flooding of low-lying forests resulting from Beaver dams, converting former closed canopy forests into open canopy wetlands.

The Massachusetts Natural Heritage & Endangered Species Program and The Nature Conservancy's Massachusetts Program developed *BioMap2* in 2010 as a conservation plan to protect the state's biodiversity. *BioMap2* is designed to guide strategic biodiversity conservation in Massachusetts over the next decade by focusing land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, exemplary natural communities, and a diversity of ecosystems.

COMPONENTS OF *BIOMAP2*: *BioMap2* Core Habitat identifies specific areas necessary to promote the long-term persistence of rare species, other Species of Conservation Concern, exemplary natural communities, and intact ecosystems.

BioMap2 Critical Natural Landscape was created to identify and prioritize intact landscapes in Massachusetts that are better able to support ecological processes and disturbance regimes, and a wide array of species and habitats over long time frames. *BioMap2* uses specific data and sophisticated mapping and analysis tools to spatially define each of these components, calling on the latest research and understanding of species biology, conservation biology, and landscape ecology.

LANDSCAPE BLOCKS: Landscape Blocks, the primary component of Critical Natural Landscape, are large areas of intact predominantly natural vegetation, consisting of contiguous forests, wetlands, rivers, lakes, and ponds, as well as coastal habitats such as barrier beaches and salt marshes. Pastures and power-line right-of-way, which are less intensively altered than most developed areas, were also included since they provide habitat and connectivity for many species.

Collectively, these natural cover types total 3.6 million acres across the state. A GIS-based computer model (the Ecological Integrity assessment) was used to identify the most intact and least fragmented areas. These large Landscape Blocks are most likely to maintain dynamic ecological processes such as buffering, connectivity, natural disturbance, and hydrological regimes, all of which help support wide-ranging wildlife species and many other elements of biodiversity. This analysis directly applied climate change adaptation strategies of selecting large, well-connected landscape patches with intact ecological processes, which are minimally impacted by other stressors. Additional habitat blocks were included in the Landscape Block delineations to support viable populations of the Special Concern Eastern Box Turtle to protect this wide-ranging, but vulnerable, habitat generalist.

Landscape Blocks were selected across eight different ecoregions in Massachusetts in order to include a diversity of ecological settings. Ecoregions are geographic areas with similar

topography, geology, and predominant vegetation, and therefore represent areas of relatively homogeneous ecological setting. In order to identify critical Landscape Blocks in each ecoregion, different Ecological Integrity thresholds were used to select the largest intact landscape patches in each ecoregion while avoiding altered habitat as much as possible. This ecoregional representation accomplishes a key goal of *BioMap2* to protect the ecological stage that supports a broad suite of biodiversity in the context of climate change. Blocks were defined by major roads, and minimum size thresholds differed among ecoregions to ensure that *BioMap2* includes the best of the best in each ecoregion.

ACHIEVING STRATEGIC CONSERVATION WITH *BioMap2*: In *BioMap2*, the Core Habitat and Critical Natural Landscape are complementary and overlapping, and were delineated based on separate criteria. Each represents a different scale of biodiversity in Massachusetts, yet the protection of both is important to conserve the full suite of biodiversity in the state.

BioMap2 is designed to prioritize Species Habitats, Natural Communities, and intact ecosystems to guide land protection and stewardship for biodiversity. Biodiversity conservation also requires maintaining intact landscapes at larger scales. Landscapes are defined as mosaics of forests, wetlands, rivers, shrublands, and other habitats, from valley bottoms to ridgetops. Intact landscapes provide an aggregation of contiguous habitats and connectivity among them, to support the long-term viability of wildlife populations and to help maintain natural ecosystem processes. And while strict *land protection* is a crucial tool used to protect biodiversity at the scale of *BioMap2* Core Habitats, thoughtful *land use* can be employed to protect biodiversity within these larger Landscape Blocks. For example, timber harvests in working forests and certain agricultural practices can still allow for the large-scale ecological processes Landscape Blocks provide, but also support human communities that rely on our state's natural resources. Land management may also be necessary in some areas to maintain the diversity of habitats within Landscape Blocks that have become limited over time, as human development has encroached on natural areas.